DOCUMENT RESUME

ED 269 387 SP 027 563

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TITLE The Effects of a Behaviorally Oriented Tenth Grade Nutrition Curriculum.
SPONS AGENCY National Heart and Lung Inst. (DHHS/NIH), Bethesda, MD.
PUB DATE [86]
GRANT HL07034; HL21906
NOTE 31p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Family Influence; Grade 10; *Health Education; High Schools; *Knowledge Level; *Nutrition Instruction; Student Attitudes; *Student Behavior

ABSTRACT

Two studies examined the impact of a five-session behaviorally oriented nutrition curriculum on health knowledge, behavioral intentions, attitudes, and self-reported behavior of tenth grade students. The first study examined the impact of a nutrition curriculum when combined with materials for the family and the impact of the curriculum when administered by a health educator or the classroom teacher. The second study examined the impact of the type of classroom instructor on student knowledge and behavior when administering the behaviorally oriented nutrition curriculum and the standard, or regular, nutrition curriculum. In both studies, outcome measures included pre- and post-assessments of nutrition knowledge, self-reported dietary behavior, self-efficacy, behavioral intentions, and attitudes. Significant changes were observed in student knowledge and behavioral intentions, and significant differences were seen for attitude change. Significantly greater changes in attitudes were seen when the curriculum was taught by the classroom teacher, and significantly greater improvements in knowledge were seen when the health educator administered the curriculum. The special behaviorally oriented curriculum brought about greater changes in knowledge, behavioral intentions, and self-reported behavior than did the more standard curriculum. (CB)

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THE EFFECTS OF A BEHAVIORALLY ORIENTED TENTH GRADE NUTRITION CURRICULUM

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Running Head: The Effects of a Behaviorally Oriented Curriculum.

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These studies were supported in part by Grant HL 21906 from the National Heart, Lung, and Blood Institutes of Health. Ms. Loesch-Griffin was supported by Public Health Service Training Grant No. HL07034 from the National Heart, Lung, and Blood Institute of the National Institutes of Health.

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SP027963

The authors wish to acknowledge the statistical consultation and analyses of Ms. Sabrina Lin, M.A. In addition, we wish to acknowledge the commitment and efforts of the teachers, principals and administrators of Pacific Grove, Monterey, Alisal, Salinas, North Salinas and Seaside High School.

A B S T R A C T

There is increasing evidence that the health behaviors of children and adolescents play a significant role in their health behavior and in their health as an adult (The Bogalusa Heart Study, 1986). The present paper examines the impact of a five session behaviorally oriented nutrition curriculum on health knowledge, behavioral intentions, attitudes and self-reported behavior of tenth graders and replicates an earlier study that demonstrated that a behaviorally oriented nutrition curriculum can significantly change adolescents nutrition knowledge and self-reported behavior. Two studies were conducted, the first study, examined the impact of a nutrition curriculum when combined with materials for the family and the impact of the curriculum when administered by a health educator or the classroom teacher. Study two examined impact of the type classroom instructor on student knowledge and behavior when administering the behaviorally oriented nutrition curriculum and the standard or regular nutrition curriculum. In both studies all conditions were randomly assigned within schools and "no treatment" control conditions were included. In both studies outcome measures included pre and post-assessments of nutrition knowledge, self-reported dietary behavior, self-efficacy, behavioral intentions and

attitudes. In study one, there were significant changes in knowledge and behavioral intentions and significant differences were seen in type of instructor for attitude change and behavioral intentions. These results were partially replicated in study two, with significantly greater changes in attitudes when the curriculum was taught by the classroom instructor. In addition, there were significantly greater improvements in knowledge when the health educator was administering the curriculum. In both studies, type of instructor produced no differential impact on self-reported behavior, observed behavior or self-efficacy. Study two also showed significant effects for type of curriculum with the special behaviorally oriented curriculum bringing about greater changes in knowledge, behavioral intentions and self-reported behavior.

INTRODUCTION

Cardiovascular disease accounts for almost 50% of all deaths each year (Kolbe, 1983). A growing body of evidence suggests that diet, nutrition, blood pressure and physical activity play an important role in the etiology and progression of this disease. While heart disease is usually not manifested until middle age or later, the development of the disease can actually begin during childhood and youth (The Bogalusa Heart Study, 1986; Inter-Society Commission for Heart Disease Resources, Atherosclerosis Study Group, and Epidemiology Study Group, 1974). Epidemiological and clinical studies suggest that early intervention may substantially reduce mortality from cardiovascular disease. (Kannel, 1971). Therefore, changing the health habits of children during school age years, may be critical in establishing healthy living patterns throughout their lifetime.

Despite the need for cardiovascular health education, few empirical studies of nutrition programs exist for elementary and secondary schools. Of those that do, many lack strict treatment conditions, effective measurements for knowledge or behavior changes, as well as adequate teacher training and follow-up (Saylor et al., 1982). There has been a general absence of evaluation of nutrition programs for adolescents. Such research is critical, since this is an age of

experimentation, where exposure to influences outside the family and school setting emerge and unhealthy eating patterns become more common. In fact, studies indicate (Lamme and Lamme, 1980; Singleton and Rhoads, 1982) that as children become older and are exposed to junk foods, their snack preferences tend to be less nutritious.

In a recent review of nutrition education studies, Saylor et al. (1982) listed a number of considerations which should be addressed before one attempts to develop and deliver nutrition education to secondary students. In addition to psychological factors, they include study of the setting for delivering health education, socioeconomic levels of students, age and grade level of students, teaching methods, and curriculum content. However, a priority research question they raised regarding the development and delivery of nutrition education was, "who should teach nutrition education?"

Training, teaching styles and teaching backgrounds may make a difference in the outcome of nutrition education programs. The primary focus in previous studies was the teachers ability to influence changes in adolescents' dietary knowledge and nutrition behavior. In these studies, the effects of teacher training (Coates et al., 1981; O'Connel et. al., 1981; Lovett et. al., 1970), teacher

interest and enthusiasm (Conley and Jackson, 1948) as well as support from school administrators (Head, 1974) were examined. While a variety of teaching approaches were often used by nutrition researchers, many of the authors failed to outline the extent and method of the training involved. (Bell and Lamb, 1971; Jenkins et. al., 1975; Williams et. al., 1980).

The Stanford Heart Disease Prevention Program, is a nine year community research demonstration project designed to investigate the impact of a comprehensive, integrated cardiovascular health promotion program on CVD risk, morbidity and mortality. The two main educational goals of the Stanford Heart Disease Prevention Program are to develop effective health education programs and to institutionalize these programs through community organizations such that they are maintained within existing systems over a long period of time.

The two studies reported here are carried out in six high schools in a northern California county, two of which participated in the earlier pilot study (King et. al., 1985). These replications attempt to address the question of generalization of the results to other settings as well as to study two additional issues that are crucial

to the institutionalization and maintenance of a nutrition curriculum in school systems. The first investigates the impact of materials for the family on adolescents knowledge and behavior. Much of the food that an adolescent consumes and perhaps most early nutrition knowledge is gained from family members. It is reasonable to assume that an effective home based program could reinforce and increase the impact of a classroom based curriculum. Both studies investigate the impact of outside expert and classroom teacher on students knowledge and self-reported behavior. Both of these issues are crucial to the development of a maximally effective program and to the effective maintenance of that program.

The second study evaluates the impact of the behaviorally oriented curriculum and the standard nutrition curriculum that was currently being used in the schools. The second study, as stated above, also looks at the impact of teacher versus outside expert on students knowledge, attitudes, confidence, intention and self-reported behavior.

The present paper reports data gathered in two replication studies assessing the effectiveness of a behaviorally-oriented nutrition education curriculum for 10th graders. The purpose of these two

studies was to examine variables that would affect the impact of the curriculum (family materials) and the impact of an in-classroom teacher and a health educator. The behavioral aspect of the nutrition curriculum is based on the Bandura's Social Learning theory (Bandura, 1977 and later references) and Roger's Adoption Diffusion Theory (Rogers and Shoemaker, 1971). The information aspect of the program is based on the Stanford Heart Disease Prevention Program's recommended diet which is high in complex carbohydrates and fiber and low in sugar, salt, saturated fats and cholesterol. These studies are an outgrowth of a pilot program (King, et.al., 1985), which used the behaviorally oriented nutrition curriculum (titled Healthy Living) in two high schools in Northern California as part of the Stanford Heart Disease Prevention Program's Five City Project (Farquhar et. al., 1983). Results from this study revealed significant changes in dietary knowledge, behavior and snack food selection, as a result participating in the Healthy Living Program. In the replication studies, the same curriculum was used along with a four-step nutrition kit as a embossed home activity.

These two current studies attempted to replicate the earlier results, as well as expand our current understanding about the impact of type of teacher and the curriculum effects, and to evaluate the specific effects of a behaviorally oriented curriculum and an informationally oriented curriculum (the standard curriculum).

The question addressed by these two studies were:

- Could earlier results of significant changes in knowledge and self-reported behavior be replicated?

- Would there be significantly greater impact on knowledge and self-reported behavior when embossed home activity was incorporated into the curriculum.?

- Would the expert taught classes produce greater knowledge changes and behavior changes?

- Would the behaviorally oriented curriculum produce greater effects than the standard curriculum?

METHODS

Subjects

The participants were tenth grade students from three different communities in Northern California. There were six schools involved with a total of 660 students participating in the two studies. The overall ethnic distribution and socioeconomic status of the school populations were very diverse (see Table 1).

INSERT TABLE 1 ABOUT HERE

The percentages in this table were based on data and estimates from school administrators. The first study was carried out in three high schools where the student population was 42-88% Caucasian and ranged from lower middle class (school 3) to middle class (school 1 and 2). The second study was carried out in three additional schools (schools 4,5,6). Fifty two percent of the student body in school 4 was Hispanic and from lower SES backgrounds. Both schools 5 and 6 had a fairly balanced ethnic distribution, 52-54% Caucasian and

approximately 46-48% minorities (mainly Hispanic and Asian) and were primarily middle class. The distribution of males to females was comparable within all the schools. Approximately 20-30% of the students attended 4 year college in schools 1,2,3 and 6 compared to over 45% in school 5 and only 15% in school 4.

The two studies utilized a pre-test/post-test design for all measures. Tenth grade classes within each school were randomly assigned to treatment or control conditions. In Study one, the school condition of embossed home activity was not radomly assigned but was a sample of convenience in which one school purchased a home based nutrition program and other schools did not.

Procedures

The classroom intervention consisted of a 5-6 session curriculum (50-60 minutes) taught over a 2-3 week period. The sessions focused on dietary and exercise information as well as cognitive-behavioral strategies for modifying current exercise and dietary patterns. The program's information component follows the Stanford Heart Disease Prevention Program recommendations, which stresses a diet high in complex carbohydrates and low in saturated fat, sugar and salt and encourages aerobic exercise 3-4 times a week for at least 20

minutes. The program's behavioral component aimed at cognitive-behavioral strategies which included contracting and goal setting for food and exercise changes; keeping a dairy of food choices and food preparations, problem solving; and role playing. Awareness of pressures and barriers to "unhealthy" food choices and changes was done through selecting food labels and advertisement. The format included didactic instruction, audiovisual presentations, in-class and take home exercises. A heart healthy food tasting took place after each session. Students completed a nutritional and exercise self-assessment at the beginning of the program as baseline information. Curriculum objectives included: explaining nutrition myths (sessions 1 and 2); identifying "less of", "more of" foods (lesson 2); changing dietary behaviors such as food selections and consumption through self-monitoring strategies, such as goal setting, problem solving, behavioral rehearsal and feedback (sessions 2, 3, and 4). A four step nutrition kit was distributed as a take home assignment in some classes to complement each days lesson and to be shared with the student's families in some schools in study 1. In study 2, all schools used the kit.

Independent Variables

The independent variables constituted the various treatment conditions to which students were assigned. In study 1 this involved the Stanford Heart Disease Prevention Program curriculum with or without the home-based nutrition kit, taught by either the regular classroom teacher or a masters level health expert. In study 2, the independent measures included either the classroom teacher or the outside professional or the standard nutrition curriculum taught by the classroom teacher.

Dependent Measures

Every student completed a 20 minute, self-administered, pen and pencil questionnaire approximately 10 days before the program (pre-test) and again 10 days after the program (post-test). The questionnaire consisted of sections reflecting the various components of the Cognitive-Behavior Change Model. The dependent measures included: true/false and multiple choice questions about KNOWLEDGE on fats, carbohydrates, protein, exercise and general physiology; the frequency of self-reported BEHAVIOR or SKILLS related to eating certain food items; the level of confidence (MOTIVATION

sub-component) in making food and exercise choices and intentions (MOTIVATION sub-component) to eat in specific ways; AWARENESS or attitudes related to dietary practices relevant to adolescents. The students were presented with a choice of healthy (apples, raisins and breadsticks) and unhealthy snacks (potato chips and cookies) as compensation for completing the questionnaire. An outsider unobtrusively recorded snack selections. (controlled ACTION measure). At school 4, students were given coupons for a free snack in their school cafeteria. Actual food choice were recorded by a cafeteria staff member blind to experimental conditions (national ACTION measure). Six month follow-up was completed during the spring quarter. A one year follow-up is scheduled. Study 2 was completed during the spring of 1985.

Data Analysis

Student t-tests and tests for analysis of variance were run on each of the measures to determine the differences between treatment and control conditions, between treatment interventions and within and between school differences.

R E S U L T S

Study One

Table two shows the means and standard deviations on all dietary variables for the combined treatment groups and the control groups. When all treatment conditions (with kit vs. without kit and teacher vs. expert taught) are combined the results show that the curriculum is more effective than no treatment at all in changing students' knowledge ($F=146.0$ $P<.001$) and intentions ($F=6.43$, $P<.01$). Even though the control group made some increases in pre to post-knowledge levels, the increase was significantly less than those achieved by students in the treatment conditions.

INSERT TABLE 2 ABOUT HERE

Table 3 contrasts the home based education conditions with no home materials and further demonstrates the strength of the curriculum when used with the home materials. The treatment with the kit achieves more significant differences in knowledge ($F=3.70$, $P<.05$) and intentions ($F=6.4$, $P<.01$), but no difference in attitude, confidence and self-reported behavior.

Thus, the use of home based materials enhances the overall impact on knowledge and intention to change.

INSERT TABLE 3 ABOUT HERE

Table 4 shows the effects of teaching condition on all dietary variables. Classroom teachers achieve greater changes in students' attitude and intention than do the expert when taught students.

Study Two

Table 5 presents the means and standard deviations for the attitude, knowledge, confidence, intention and self-reported behavior scales. In study two, significant changes from pre to post-test were achieved for knowledge ($F=43.7$, $P<.01$), confidence ($F=6.52$ $P<.01$) and self-reported behavior ($F=8.09$, $P<.01$). Both studies, 1 and 2, show strong knowledge changes, and although there were differential intention changes in

study 2 they were not statistically significant. Both studies showed small shifts in self-reported behavior but these shifts were only significant in study two. Only study two show changes in confidence.

INSERT TABLE 5 ABOUT HERE

Table 6 shows the contrasting effects of the behaviorally oriented curriculum and the standard curriculum. Analyses of revealed differences in knowledge variance ($P<.001$), intention ($P<.05$) and self-reported behavior ($P<.01$). The behaviorally oriented Stanford Heart Disease Prevention Program curriculum showed greater shifts in these measures than did the standard curriculum.

INSERT TABLE 6 ABOUT HERE

In table 7, it can be seen that when the expert taught classes were compared to the teacher taught classes, that the students in the expert classes showed greater shifts in knowledge and students in the teacher taught classes showed small but significantly greater increases in positive nutrition attitudes.

INSERT TABLE 7 ABOUT HERE

D I S C U S S I O N

These results indicate that a behaviorally oriented curriculum can consistently bring about knowledge changes. There are consistent changes in behavioral intentions and self-reported behavior although these changes are not always significant. These findings may indicate a need to further specifying the behavior changes in the curriculum as well as a need to develop more detailed behavioral self-report measures as well as actual behavior measures. Home based materials seem to positively influence students knowledge and behavior. The process for this influence however needs more research. While regular classroom instructors seem to bring about consistently greater attitude changes an expert in nutrition produces greater knowledge.

The impact of instructor produced mixed effects with greater student knowledge change from the expert instructor and greater change in positive attitudes from the regular classroom teacher.

The results have implications, both for curriculum changes and for revisions of teacher training and perhaps teacher selection. In addition, these two studies raise more questions about the role of family materials to support and reinforce change. Study two does

indicate that a behaviorally oriented curriculum is better able to produce overall effects on all dietary variables except attitudes.

The results demonstrate that a classroom based curriculum, reinforced by home activities can bring about some nutritional changes in adolescents knowledge and behavior. The potential for public health impact on adolescents long term health exists. Further research on enhancing the behavior changes and utilizing the family environment is needed for this impact to reach its total capacity for bringing about healthier dietary habits in adolescents.

TABLE 1

DEMOGRAPHIC BREAKDOWN ON STUDY 1 AND 2 SCHOOLS

	Males	Black	White	Hispanic	4 years college
	%	%	%	%	%
School 1 n-158	52	3	88	1	24
School 2 n-425	52	13	57	7	20
School 3 n-300	51	28	42	8	20
School 4 n-350	53	3	10	82	15
School 5 n-551	53	3	52	29	45
School 6 n-543	48	1	54	35	21

TABLE 2

STUDY ONE: CONTRASTS BETWEEN TREATMENT AND CONTROL GROUPS ON DIETARY VARIABLES

VARIABLE	BEHAVIORAL CURRICULUM Means SD	CONTROL GROUP Means SD
Attitude:		
Pre-test	4.0(1.0)	3.8(1.0)
Post-test	4.2(1.0)	3.0(1.0)
	N=192	N=149
Knowledge:		
Pre-test	5.44(2.5)	6.1(2.3)***
Post-test	10.1(2.7)	6.7(2.6)
	N=194	N=150
Confidence		
Pre-test	3.5(.9)	3.4(.8)
Post-test	3.5(.9)	3.4(.8)
	N=192	N=147
Intention:		
Pre-test	3.0(.7)	3.0(.7)**
Post-test	3.2(.7)	3.0(.7)
	N=186	N=149
Self-Reported Behavior:		
Pre-test	2.9(.4)	2.8(.4)
Post-test	3.0(.5)	2.9(.4)
	N=194	N=150

** $p<.01$
*** $p<.001$

TABLE 3

STUDY ONE: IMPACT OF HOME MATERIALS
ON DIETARY VARIABLES

VARIABLE	SHDPP-WITH HOME	SHDPP-WITHOUT HOME
Attitude:		
Pre-test	4.1(.93)	3.8(1.1)
Post-test	4.3(.97)	4.0(1.1)
	N=143	N=51
Knowledge:		
Pre-test	5.5(2.4)	7.1(2.4)
Post-test	9.9(2.7)	10.6(2.8)*
	N=143	N=51
Confidence:		
Pre-test	3.5(.8)	3.5(.96)
Post-test	3.6(.8)	3.4(1.1)
	N=141	N=51
Intention:		
Pre-test	3.0(.7)	3.0(.8)
Post-test	3.3(.7)	3.1(.8)**
	N=135	N=51
Self-Reported Behavior:		
Pre-test	2.8(.45)	3.0(.4)
Post-test	2.9(.47)	3.1(.4)
	N=143	N=51

* $p<.05$
** $p<.01$

TABLE 4

STUDY ONE: EFFECTS TEACHING CONDITION ON DIETARY VARIABLES

VARIABLE	SHDPP-EXPERT TAUGHT	SHDPP-TEACHER TAUGHT
Attitude:		
Pre-test	4.1(.9)	3.8(1.1)
Post-test	4.2(1.0)	4.3(1.0)
	N=137	N=55
Knowledge:		
Pre-test	5.9(2.6)	6.0(2.3)
Post-test	10.1(2.8)	10.2(2.6)
	N=137	N=57
Confidence:		
Pre-test	3.5(.9)	3.5(.8)
Post-test	3.5(.9)	3.7(.9)
	N=137	N=55
Intention:		
Pre-test	3.1(.7)	3.0(.8)
Post-test	3.2(.7)	3.3(.7)
	N=135	N=51
Self-Reported Behavior:		
Pre-test	2.9(.4)	2.9(.4)
Post-test	3.0(.4)	2.9(.5)
	N=137	N=57

*p<.05
**p<.01

TABLE 5

STUDY TWO: CONTRASTS IN TREATMENT AND CONTROL GROUPS

VARIABLE	BEHAVIORAL CURRICULUM Means SD	CONTROL GROUP Means SD
Attitude:		
Pre-test	4.1(.8)	4.0(.8)
Post-test	4.2(1.0)	4.1(.8)
	N=199	N=37
Knowledge:		
Pre-test	6.0(2.4)	5.4(2.0)***
Post-test	9.5(3.0)	5.7(2.5)
	N=206	N=37
Confidence:		
Pre-test	3.4(.8)	3.4(.7)**
Post-test	3.6(.7)	3.3(.9)
	N=200	N=37
Intention:		
Pre-test	3.1(.7)	3.0(.6)
Post-test	3.4(.6)	3.2(.6)
	N=200	N=37
Self-Reported Behavior:		
Pre-test	2.9(.4)	2.9(.4)**
Post-test	3.0(.4)	2.8(.3)
	N=200	N=37

*p<.05
**p<.01
***p<.001

TABLE 6

STUDY TWO: EFFECTS OF TYPE OF CURRICULUM ON DIETARY VARIABLES

VARIABLE	SHDPP CURRICULUM Means SD	STANDARD CURRICULUM Means SD
Attitude:		
Pre-test	4.1(.8)	4.1(.9)
Post-test	4.2(1.0)	4.2(.8)
	N=199	N=70
Knowledge:		
Pre-test	6.0(2.4)	6.0(2.7)***
Post-test	9.5(3.0)	7.8(3.3)
	N=206	N=73
Confidence:		
Pre-test	3.4(.8)	3.2(.7)
Post-test	3.6(.7)	3.4(.9)
	N=200	N=70
Intention:		
Pre-test	3.1(.7)	3.1(.7)*
Post-test	3.4(.6)	3.2(.7)
	N=200	N=73
Self-Reported Behavior:		
Pre-test	2.9(.4)	2.8(.4)**
Post-test	3.0(.4)	2.8(.4)
	N=200	N-70

*p<.05
**p<.01
***p<.001

TABLE 7

STUDY TWO: EFFECTS OF TEACHING CONDITIONS ON DIETARY VARIABLES

VARIABLE	SHDPP-EXPERT TAUGHT Means SD	SHDPP TEACHER TAUGHT Means SD
Attitude:		
Pre-test	4.1(.7)	4.1(.8)*
Post-test	3.9(1.0)	4.4(.9)
	N=64	N=136
Knowledge:		
Pre-test	5.5(2.0)	6.2(2.5)**
Post-test	9.7(2.9)	9.3(3.0)
	N=65	N=141
Confidence:		
Pre-test	3.4(.8)	3.4(.8)
Post-test	3.5(.7)	3.6(.7)
	N=64	N=136
Intention:		
Pre-test	3.1(.8)	3.0(.7)
Post-test	3.5(.6)	3.4(.6)
	N=64	N=141
Self-Reported Behavior:		
Pre-test	2.8(.3)	2.9(.4)
Post-test	3.0(.4)	3.0(.4)
	N=64	N=136

*p<.05
**p<.01

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